

compensate for the effects of depressed signal level at the receiver or the effects of high bit error rates caused by signal fading or interference. Such power increases, however, are infrequent and, when they do occur, are of very short duration, on the order of a few seconds per event and no more than about 0.1% over a period of a year.¹⁷ Thus, the potential for interference to other microwave systems due to ATPC is so small as to be statistically insignificant.

The benefits of ATPC in promoting spectral efficiency, as well as increased system reliability, are substantial. The traditional methods for coordinating microwave frequencies assume the use of maximum power or, where necessary to achieve coordination, recommend the use of fixed power attenuators to permanently lower transmitter output power. Both methods have drawbacks. Coordination at maximum power levels is spectrally inefficient, particularly in congested areas, while reduction of power without ATPC can result in system outages and unsatisfactory system reliability. ATPC helps with both of these problems. First, ATPC makes successful microwave operations possible at power levels as much as 10 dB below the maximum for the transmitter involved. The use of lower power makes it possible to fit microwave systems closer together and to re-use microwave frequencies more frequently. In addition, the flexible usage of short power

¹⁷ In the equipment designed by Harris, the receiver has a circuit which monitors the "requests" for power increases and provides cumulative data on all power increases over a period of a year. This device could be the mechanism for ensuring compliance with requirements for a cumulative maximum time during which automatic power increases would be permitted.

increases in ATPC technology ensures against system failures and unsatisfactory performance due to signal fading or interference.

Microwave systems using digital equipment with ATPC would normally be coordinated for and would be authorized to operate at the "nominal" rather than the "maximum" power of the transmitter. In the increasingly congested microwave environment that will occur from the migration of 2 GHz systems to higher bands, and from the expansion of existing higher band systems, ATPC would help to fit in new systems without sacrificing reliability.

The Joint Commenters recommend that the rules should be modified to provide for up to 10 dB ATPC power increases. 10 dB ATPC power increases would allow systems to operate at significantly lower nominal power levels than those limited to 3 dB increases.¹⁸ This would substantially increase the number of systems that could be authorized in a particular area by allowing them to be placed closer together and to re-use frequencies more often. Such methods will be necessary to coordinate and operate systems in a microwave environment that will be increasingly more crowded as a result of reallocation of the 2 GHz bands.

Given the infrequency (on the order of 0.1% of the time of a period of a year) and brevity (typically a few seconds) of operation at higher power levels relative to operation at "nominal" levels, use of ATPC with the recommended power increase flexibility

¹⁸ Use of ATPC with 10 dB power increases would thus be more consistent with existing rules governing transmitter power, such as Sections 21.607(a) and 94.73(a) which require the use of the minimum power necessary. Transmitters employing ATPC as proposed herein would be operating at significantly lower power levels 99.9% of the time.

will not have any significant adverse interference consequences. The probability of an ATPC path increasing its power due to a brief fading condition and an adjacent path simultaneously incurring a fading condition is statistically insignificant. Specific recommended rule amendments are set forth in the attached Appendix.

**VII. THE COMMISSION SHOULD SPEED UP
NEGOTIATIONS WITH NTIA CONCERNING
ACCESS TO THE 1.70-1.85 AND 3.6 -
3.7 GHZ BANDS BY NON-GOVERNMENTS USERS**

While the spectrum conservation measures recommended above would bring about increased efficiencies in the use of the microwave bands proposed by the Commission, the Joint Commenters respectfully disagree with the Commission's conclusion that those bands will be sufficient to meet current and future requirements for the private and common carrier microwave communication systems already using those bands, as well as the requirements of those users who will be migrating from the 2 GHz bands. More than 29,000 stations now occupy the 2 GHz bands, most of which will be required to relocate. Moreover, PCS itself will generate substantial demands for microwave systems using higher bands for support facilities, for "backhauling", that is, for interconnecting cell sites with switches, and for interconnecting the cell sites themselves. These new requirements, along with the normal expected growth of standard private and common carrier microwave facilities, will create unprecedented demands for frequencies, but the bands being made available in this proceeding will not be able to

accommodate those demands for very long.¹⁹ Accordingly, the Joint Commenters believe that the Commission must seek additional spectrum below 10 GHz.

The Joint Commenters are pleased to note the Commission's statements in Paragraphs 20 and 24 of the Notice that discussions are to be initiated with the National Telecommunications and Information Administration (NTIA) to determine whether some access to the 3.6-3.7 GHz band by fixed microwave systems is feasible, and to determine the conditions for limited access to the 1.70-1.85 GHz band. With proper coordination, a substantial number of fixed systems can be accommodated in the 3.6-3.7 GHz band, notwithstanding that band's primary allocation for radio-navigation and radiolocation. The Joint Commenters also believe that private and common carrier fixed systems can be accommodated in the 1.70-1.85 GHz band in selected areas without impeding the growth of government microwave systems in that band. Therefore, the Joint Commenters urge the Commission to take NTIA at its word, and accelerate the planned discussions so that decisions are reached in time for the conditions and standards under which access is allowed to the 3.6-3.7 and 1.70-1.85 GHz bands can be adopted in this proceeding.

¹⁹ It should also be kept in mind that the 3.7 - 4.2 GHz band proposed for use by the Commission is of marginal value because of its extensive use by fixed satellite systems, especially those transmitting to privately owned satellite receivers.

VIII.

CONCLUSION

The Joint Commenters concur with the proposals in the Notice regarding minimum path length requirements, antenna characteristics, power limitations, emission and bandwidth limitations, and frequency diversity transmissions. However, to maximize spectrum efficiency and the orderly migration of existing 2 GHz users to higher frequency bands, and to promote competition in the manufacture of microwave equipment, the Commission should adopt the rule modifications proposed herein.

Respectfully submitted,

By:



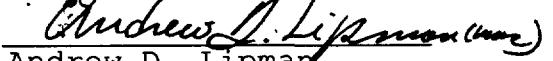
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APPENDIX A

**Recommended Channelization Plans for
the 4, 6, 10 and 11 GHz bands**

PROPOSED RECHANNELIZATION SUMMARY

From (MHz)	To (MHz)	Available Bandwidth	40 MHz	30 MHz	20 MHz	15 MHz	10 MHz	5 MHz	3.75 MHz	2.5 MHz	1.25 MHz
1,850	1,990	140					7	5			
2,130	2,150	20							12 2)	24	3)
2,180	2,200	20									
2,110	2,130	20							5 1)		
2,160	2,180	20									
Displaced Channels		220		0			7	5	5	12	24
3,700	4,200	500	6		12						
5,925	5,930	5								2	4
6,175	6,180	5									
5,930	6,110	180		6		12	18				
6,180	6,360	180									
6,110	6,170	60		2		4	6	12	16	24	48
6,360	6,420	60									
6,170	6,175	5								2	4
6,420	6,425	5									
6,525	6,530	5								2	4
6,870	6,875	5									
6,540	6,570	30					3	4	4	6	12
6,710	6,740	30									
6,580	6,710	130					13	25	30	46	92
6,740	6,870	130									
Rechannelized 4 & 6 GHz		1330	6	8	12	16	40	41	50	82	164
10,550	10,615	65							13	17	26
10,615	10,680	65									52
10,700	11,075	375	9	9	18		37				
11,230	11,605	375									
11,075	11,170	95	2	3	4		10	19	24	38	76
11,605	11,700	95									
Rechannelized 10 & 11 GHz		880	11	12	22	0	47	32	41	64	128
Total Rechannelization		2210	17	20	34	16	87	73	91	146	292

1) 3.5 MHz 2) 1.6 MHz 3) 800 KHz

3,700 - 4,200 MHz, 20.0 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	3710	3750
2	3730	3770
3	3790	3830
4	3810	3850
5	3870	3910
6	3890	3930
7	3950	3990
8	3970	4010
9	4030	4070
10	4050	4090
11	4110	4150
12	4130	4170
13	4190	4198

1 Auxiliary channels available for unpaired use

3,700 - 4,200 MHz, 40.0 MHz bandwidth channels

	Transmit (receive) (MHz)		Receive (transmit) (MHz)
1	3720	.....	3760
2	3800	.....	3840
3	3880	.....	3920
4	3960	.....	4000
5	4040	.....	4080
6	4120	.....	4160

5,925 - 6,425 MHz, 1.25 Mhz bandwidth channels 1

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	5925.625	6175.625
2	5926.875	6176.875
3	5928.125	6178.125
4	5929.375	6179.375
5	6110.625	6360.625
6	6111.875	6361.875
7	6113.125	6363.125
8	6114.375	6364.375
9	6115.625	6365.625
10	6116.875	6366.875
11	6118.125	6368.125
12	6119.375	6369.375
13	6120.625	6370.625
14	6121.875	6371.875
15	6123.125	6373.125
16	6124.375	6374.375
17	6125.625	6375.625
18	6126.875	6376.875
19	6128.125	6378.125
20	6129.375	6379.375
21	6130.625	6380.625
22	6131.875	6381.875
23	6133.125	6383.125
24	6134.375	6384.375
25	6135.625	6385.625
26	6136.875	6386.875
27	6138.125	6388.125
28	6139.375	6389.375

5,925 - 6,425 MHz, 1.25 Mhz bandwidth channels 1

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
29	6140.625	6390.625
30	6141.875	6391.875
31	6143.125	6393.125
32	6144.375	6394.375
33	6145.625	6395.625
34	6146.875	6396.875
35	6148.125	6398.125
36	6149.375	6399.375
37	6150.625	6400.625
38	6151.875	6401.875
39	6153.125	6403.125
40	6154.375	6404.375
41	6155.625	6405.625
42	6156.875	6406.875
43	6158.125	6408.125
44	6159.375	6409.375
45	6160.625	6410.625
46	6161.875	6411.875
47	6163.125	6413.125
48	6164.375	6414.375
49	6165.625	6415.625
50	6166.875	6416.875
51	6168.125	6418.125
52	6169.375	6419.375
53	6170.625	6420.625
54	6171.875	6421.875
55	6173.125	6423.125
56	6174.375	6424.375

1 Alternate channels. These channels should be used only if all other channels at 6,525 - 6,875 MHz are blocked.

5,925 - 6,425 MHz, 2.5 MHz bandwidth channels 1

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	5926.25	6176.25
2	5928.75	6178.75
3	6111.25	6361.25
4	6113.75	6363.75
5	6116.25	6366.25
6	6118.75	6368.75
7	6121.25	6371.25
8	6123.75	6373.75
9	6126.25	6376.25
10	6128.75	6378.75
11	6131.25	6381.25
12	6133.75	6383.75
13	6136.25	6386.25
14	6138.75	6388.75
15	6141.25	6391.25
16	6143.75	6393.75
17	6146.25	6396.25
18	6148.75	6398.75
19	6151.25	6401.25
20	6153.75	6403.75
21	6156.25	6406.25
22	6158.75	6408.75
23	6161.25	6411.25
24	6163.75	6413.75
25	6166.25	6416.25
26	6168.75	6418.75
27	6171.25	6421.25
28	6173.75	6423.75

1 Alternate channels. These channels should be used only if all other channels at 6,525 - 6,875 MHz are blocked.

5,925 - 6,425 MHz, 3.75 MHz bandwidth channels 1

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	6111.875	6361.875
2	6115.625	6365.625
3	6119.375	6369.375
4	6123.125	6373.125
5	6126.875	6376.875
6	6130.625	6380.625
7	6134.375	6384.375
8	6138.125	6388.125
9	6141.875	6391.875
10	6145.625	6395.625
11	6149.375	6399.375
12	6153.125	6403.125
13	6156.875	6406.875
14	6160.625	6410.625
15	6164.375	6414.375
16	6168.125	6418.125

1 Alternate channels. These channels should be used only if all other channels at 6,525 - 6,875 MHz are blocked.

5,925 - 6,425 MHz, 5 MHz bandwidth channels 1

	Transmit (receive) (MHz)		Receive (transmit) (MHz)
1	6112.5	.	6362.5
2	6117.5	.	6367.5
3	6122.5	.	6372.5
4	6127.5	.	6377.5
5	6132.5	.	6382.5
6	6137.5	.	6387.5
7	6142.5	.	6392.5
8	6147.5	.	6397.5
9	6152.5	.	6402.5
10	6157.5	.	6407.5
11	6162.5	.	6412.5
12	6167.5	.	6417.5

1 Alternate channels. These channels should be used only if all other channels at 6,525 - 6,875 MHz are blocked.

5,925 - 6,425 MHz, 10 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	5935	6185
2	5945	6195
3	5955	6205
4	5965	6215
5	5975	6225
6	5985	6235
7	5995	6245
8	6005	6255
9	6015	6265
10	6025	6275
11	6035	6285
12	6045	6295
13	6055	6305
14	6065	6315
15	6075	6325
16	6085	6335
17	6095	6345
18	6105	6355
19	6115	6365
20	6125	6375
21	6135	6385
22	6145	6395
23	6155	6405
24	6165	6415

1 Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

5,925 - 6,425 MHz, 15 MHz bandwidth channels 1

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	5937.5	6187.5
2	5952.5	6202.5
3	5967.5	6217.5
4	5982.5	6232.5
5	5997.5	6247.5
6	6012.5	6262.5
7	6027.5	6277.5
8	6042.5	6292.5
9	6057.5	6307.5
10	6072.5	6322.5
11	6087.5	6337.5
12	6102.5	6352.5
13	6117.5	6367.5 2
14	6132.5	6382.5 2
15	6147.5	6397.5 2
16	6162.5	6412.5 2

1 This channel plan to be discontinued after September 1, 1997.

2 Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

5,925 - 6,425 MHz, 30 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)	
1	5945	6195	
2	5975	6225	
3	6005	6255	
4	6035	6285	
5	6065	6315	
6	6095	6345	
7	6125	6375	1
8	6155	6405	1

1 Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

6,525 - 6875 MHz, 1.25 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	6530.625	6870.625
2	6531.875	6871.875
3	6533.125	6873.125
4	6534.375	6874.375
5	6548.125	6728.125
6	6549.375	6729.375
7	6550.625	6730.625
8	6551.875	6731.875
9	6553.125	6733.125
10	6554.375	6734.375
11	6555.625	6735.625
12	6556.875	6736.875
13	6558.125	6738.125
14	6559.375	6739.375
15	6560.625	6740.625
16	6561.875	6741.875
17	6588.125	6748.125
18	6589.375	6749.375
19	6590.625	6750.625
20	6591.875	6751.875
21	6593.125	6753.125
22	6594.375	6754.375
23	6595.625	6755.625
24	6596.875	6756.875
25	6598.125	6758.125
26	6599.375	6759.375
27	6600.625	6760.625
28	6601.875	6761.875
29	6603.125	6763.125
30	6604.375	6764.375
31	6605.625	6765.625
32	6606.875	6766.875
33	6608.125	6768.125
34	6609.375	6769.375
35	6610.625	6770.625
36	6611.875	6771.875

6,525 - 6875 MHz, 1.25 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
37	6613.125	6773.125
38	6614.375	6774.375
39	6615.625	6775.625
40	6616.875	6776.875
41	6618.125	6778.125
42	6619.375	6779.375
43	6620.625	6780.625
44	6621.875	6781.875
45	6623.125	6783.125
46	6624.375	6784.375
47	6625.625	6785.625
48	6626.875	6786.875
49	6628.125	6788.125
50	6629.375	6789.375
51	6630.625	6790.625
52	6631.875	6791.875
53	6633.125	6793.125
54	6634.375	6794.375
55	6635.625	6795.625
56	6636.875	6796.875
57	6638.125	6798.125
58	6639.375	6799.375
59	6640.625	6800.625
60	6641.875	6801.875
61	6643.125	6803.125
62	6644.375	6804.375
63	6645.625	6805.625
64	6646.875	6806.875
65	6648.125	6808.125
66	6649.375	6809.375
67	6650.625	6810.625
68	6651.875	6811.875
69	6653.125	6813.125
70	6654.375	6814.375
71	6655.625	6815.625
72	6656.875	6816.875

6,525 - 6875 MHz, 1.25 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
73	6658.125	6818.125
74	6659.375	6819.375
75	6660.625	6820.625
76	6661.875	6821.875
77	6663.125	6823.125
78	6664.375	6824.375
79	6665.625	6825.625
80	6666.875	6826.875
81	6668.125	6828.125
82	6669.375	6829.375
83	6670.625	6830.625
84	6671.875	6831.875
85	6673.125	6833.125
86	6674.375	6834.375
87	6675.625	6835.625
88	6676.875	6836.875
89	6678.125	6838.125
90	6679.375	6839.375
91	6680.625	6840.625
92	6681.875	6841.875
93	6683.125	6843.125
94	6684.375	6844.375
95	6685.625	6845.625
96	6686.875	6846.875
97	6688.125	6848.125
98	6689.375	6849.375
99	6690.625	6850.625
100	6691.875	6851.875
101	6693.125	6853.125
102	6694.375	6854.375
103	6695.625	6855.625
104	6696.875	6856.875
105	6698.125	6858.125
106	6699.375	6859.375
107	6700.625	6860.625
108	6701.875	6861.875

6,525 - 6875 MHz, 2.5 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	6526.25	6871.25
2	6528.75	6873.75
3	6548.75	6728.75
4	6551.25	6731.25
5	6553.75	6733.75
6	6556.25	6736.25
7	6558.75	6738.75
8	6561.25	6741.25
9	6588.75	6748.75
10	6591.25	6751.25
11	6593.75	6753.75
12	6596.25	6756.25
13	6598.75	6758.75
14	6601.25	6761.25
15	6603.75	6763.75
16	6606.25	6766.25
17	6608.75	6768.75
18	6611.25	6771.25
19	6613.75	6773.75
20	6616.25	6776.25
21	6618.75	6778.75
22	6621.25	6781.25
23	6623.75	6783.75
24	6626.25	6786.25
25	6628.75	6788.75
26	6631.25	6791.25
27	6633.75	6793.75
28	6636.25	6796.25
29	6638.75	6798.75
30	6641.25	6801.25
31	6643.75	6803.75
32	6646.25	6806.25
33	6648.75	6808.75
34	6651.25	6811.25
35	6653.75	6813.75
36	6656.25	6816.25

6,525 - 6875 MHz, 2.5 MHz bandwidth channels

	Transmit (receive) (MHz)		Receive (transmit) (MHz)
37	6658.75	.....	6818.75
38	6661.25	.....	6821.25
39	6663.75	.....	6823.75
40	6666.25	.....	6826.25
41	6668.75	.....	6828.75
42	6671.25	.....	6831.25
43	6673.75	.....	6833.75
44	6676.25	.....	6836.25
45	6678.75	.....	6838.75
46	6681.25	.....	6841.25
47	6683.75	.....	6843.75
48	6686.25	.....	6846.25
49	6688.75	.....	6848.75
50	6691.25	.....	6851.25
51	6693.75	.....	6853.75
52	6696.25	.....	6856.25
53	6698.75	.....	6858.75
54	6701.25	.....	6861.25

6,525 - 6875 MHz, 3.75 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	6549.375	6729.375
2	6553.125	6733.125
3	6556.875	6736.875
4	6560.625	6740.625
5	6589.375	6749.375
6	6593.125	6753.125
7	6596.875	6756.875
8	6600.625	6760.625
9	6604.375	6764.375
10	6608.125	6768.125
11	6611.875	6771.875
12	6615.625	6775.625
13	6619.375	6779.375
14	6623.125	6783.125
15	6626.875	6786.875
16	6630.625	6790.625
17	6634.375	6794.375
18	6638.125	6798.125
19	6641.875	6801.875
20	6645.625	6805.625
21	6649.375	6809.375
22	6653.125	6813.125
23	6656.875	6816.875
24	6660.625	6820.625
25	6664.375	6824.375
26	6668.125	6828.125
27	6671.875	6831.875
28	6675.625	6835.625
29	6679.375	6839.375
30	6683.125	6843.125
31	6686.875	6846.875
32	6690.625	6850.625
33	6694.375	6854.375
34	6698.125	6858.125

6,525 - 6875 MHz, 5.0 MHz bandwidth channels

	Transmit (receive) (MHz)	Receive (transmit) (MHz)
1	6545	6725
2	6550	6730
3	6555	6735
4	6560	6740
5	6590	6750
6	6595	6755
7	6600	6760
8	6605	6765
9	6610	6770
10	6615	6775
11	6620	6780
12	6625	6785
13	6630	6790
14	6635	6795
15	6640	6800
16	6645	6805
17	6650	6810
18	6655	6815
19	6660	6820
20	6665	6825
21	6670	6830
22	6675	6835
23	6680	6840
24	6685	6845
25	6690	6850
26	6695	6855
27	6700	6860
28	6705	6865
29	6710	6870

1 Use of this frequency is authorized on a non-interference basis to broadcast operations in the band 6875-7125 MHz.

6,525 - 6875 MHz, 10.0 MHz bandwidth channels

	Transmit (receive) (MHz)		Receive (transmit) (MHz)	
1	6545	1	6715	1
2	6555	1	6725	1
3	6565	. . . . .	6735	
4	6585	. . . . .	6745	
5	6595	. . . . .	6755	
6	6605	. . . . .	6765	
7	6615	. . . . .	6775	
8	6625	. . . . .	6785	
9	6635	. . . . .	6795	
10	6645	. . . . .	6805	
11	6655	. . . . .	6815	
12	6665	. . . . .	6825	
13	6675	. . . . .	6835	
14	6685	. . . . .	6845	
15	6695	. . . . .	6855	
16	6705	. . . . .	6865	
17	6535	2	6575	2

1 These frequencies may be assigned for unpaired use.

2 Available for emergency restoration, maintenance bypass, or other temporary-fixed purposes. Such use on a non-interference basis to other frequencies in this band. Interference analysis required by Section 94.63(a) does not apply to this frequency pair.